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FLOOD PLAIN MANAGEMENT

**A Study Of South Fork
Shenandoah Tributaries**

Rockingham County, Virginia

APPENDIX VIII

PLEASANT RUN

August 1983

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FOREWORD

The main report on the Flood Plain Management Study of South Fork Shenandoah River Tributaries provides information and data needed for use by administrators and the general public. Discussion of findings and recommendations relevant to the total study area are included.

Eight appendixes or technical reports include specifics on each tributary as listed below. Tables, flood profiles and area-flooded photomaps provide information for user agencies and individuals to make technical decisions and to comply with regulations related to the use of flood plains.

Appendix I	Stony Run
Appendix II	Quail Run - Boone Run
Appendix III	Cub Run - Big Run
Appendix IV	Naked Creek
Appendix V	Dry Run
Appendix VI	Hawksbill Creek
Appendix VII	Mill Creek - Congers Creek
Appendix VIII	Pleasant Run

We thank those who contributed their active interest, cooperation, and information to this project.

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Pleasant Run

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APPENDIX VIII
South Fork Shenandoah River Tributaries
FLOOD PLAIN MANAGEMENT STUDY
Technical Report
PLEASANT RUN
Rockingham County, Virginia

INTRODUCTION

This technical report on Pleasant Run is one of eight such appendixes to the Flood Plain Management Study on South Fork Shenandoah River Tributaries. The main report includes items such as authorities, responsibilities, scope, procedures, description, recommendations, and data common to the tributaries and relevant to the total project.

The first sections of this appendix present general information pertinent to the study on Pleasant Run. Included are brief discussions of natural values, alternate solutions to the flood problems, and suggested items for the flood plain management program. The last section contains data and exhibits needed to make technical decisions for regulation and use of the flood plain.

DESCRIPTION OF STUDY AREA

Upstream Drainage Area

The Pleasant Run drainage area comprises eight square miles above its mouth at the South Fork Shenandoah River (see Figure 1). The Shenandoah River is a subbasin of the Potomac River which is in the Mid-Atlantic Region as designated by the Water Resources Council. The USGS Hydrologic Unit code number in the area is 02070005. The watershed is in the Appalachian Ridges and Valleys physiographic province. Soils in the drainage area are formed mainly in residuum of limestone, dolomite and calcareous shale in the Shenandoah Valley. Frederick-Lodi-Rock Outcrop and Endcav-Carbo-Rock Outcrop are the predominant soil associations. Upland land use is about 12 percent rural residential, farmstead, and other built-up areas. The remainder includes about 15 percent woodland, 30 percent cropland, and 43 percent pasture, meadow and idle brushland.

Flood Plain

The study area includes the flood plain along 5.1 miles of Pleasant Run. It extends from the junction at South Fork Shenandoah River up through the community of Pleasant Valley. Land use in the flood plain is about 70 percent pasture, hay and meadow, 25 percent cropland, 4 percent woods, and 1 percent miscellaneous. About 58 bridges, dwellings, farm buildings and other structures would be subject to some damage during extreme floods.

Natural and Beneficial Flood Plain Values

The stream corridor through the flood plain has limited potential for nongame fish and wildlife habitat. Streambank stabilization and protection and establishment of vegetation cover are the primary needs to improve this potential.

FLOOD HISTORY

Flooding on Pleasant Run usually results from intense thunderstorm activity. Excess rainfall concentrates quickly on the steep slopes; flood stages rise rapidly and fall just as quickly. Limited flooding and damage may occur several times each year. On average, moderately severe damages are experienced at three to five year intervals. No records or recollections were noted on unusually severe floods on Pleasant Run. Average annual flood damages were estimated to be about \$10,000.

FLOOD POTENTIAL

Present Conditions

Extreme floods would inundate about 128 acres of primarily agricultural land (see Table below). Extensive damage would be done to the land, crops, fences, farm roads, buildings and machinery. Less extensive but more critical damage would accrue to dwellings. Velocities would average about three feet per second and exceed five feet per second in some reaches. Out-of-bank stages would range from about three to sixteen feet. Duration of flooding would seldom exceed six hours except during storms of intense and prolonged rainfall. Figures 1, 2, and 3 show potential flood stages.

The acres tabulated below are used primarily for pasture and other agricultural uses. Only about 1 percent is occupied by structure sites, but varying amounts of damage would occur to 6 dwellings, 44 farm buildings, and 8 bridges.

<u>Type of Damage</u>	<u>Acres Inundated</u>	
	<u>100-year flood</u>	<u>500-year flood</u>
Agricultural	127	145
Miscellaneous	<u>1</u>	<u>1</u>
TOTAL	128	146

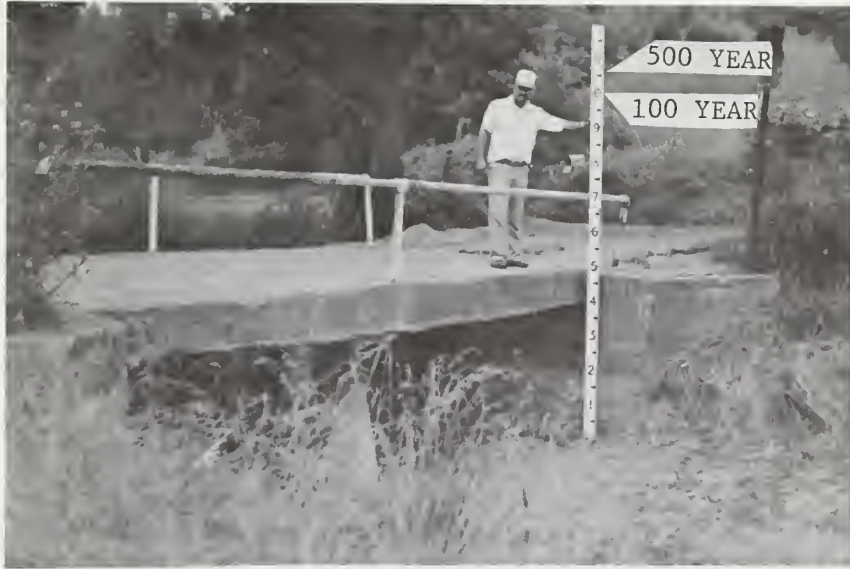


Figure 1. Potential Flood Stages at Cross-Section 74, downstream of State Route 711 over Pleasant Run.



Figure 2. Potential Flood Stages at Cross-Section 78, downstream of State Route 704 over Pleasant Run.



Figure 3. Potential Flood Stages at Cross-Section 96, State Route 257 over Pleasant Run.

Limitations on Use of Data. The flood elevations given in this report should be considered as minimum elevations. During floods, uprooted trees and other debris may collect on bridges and culverts and clog the channels. Such obstructions increase the depth and extent of flooding. Analyses were made without showing the effects of potential obstructions. Also, extremely rare events such as dam failure and climatic changes were not analyzed.

Future Conditions

The hydrologic conditions in the upstream areas are expected to improve as farmers and foresters continue to apply good management and conservation practices. This improvement is expected to reduce runoff approximately to the extent that additional development will increase runoff. Therefore, the flood hazard and damage potential is not expected to change significantly in the next 10 to 15 years.

FLOOD PLAIN MANAGEMENT

The main report includes a discussion of existing programs, current regulations, availability of flood insurance, recommendations, and related items relevant to the total study. The items discussed below relate only to Pleasant Run.

Floodway. The data for a "first trial" or computed floodway is filed with the basic data for Pleasant Run. The results indicate that hazardous conditions of depth and/or velocity prevail at current 100-year flood levels in most reaches, and that generally little additional encroachment should be allowed. The data can be used as a basis for further study of local measures, but it is suggested that no continuous or extensive floodway be considered.

Recommendations

In preparation of their comprehensive flood management program, the local sponsors should implement the following recommendations on Pleasant Run:

- Monitor future developments in the watershed to assure that regulations are followed so as not to increase the flood hazard;
- Assist landowners in studies of local protection measures to reduce streambank erosion and the spread of floodwaters; and
- Encourage the re-establishment of natural vegetation so as to improve the fish and wildlife habitat.

Evaluation of Potential

The potential for reducing the flood hazard on Pleasant Run is limited by the relatively low value of damages from flooding.

A brief study indicates that flood control dams could not be economically justified. Flood proofing could be feasible for some properties. Flood warning systems should be investigated.

Hydrologic conditions under current land use and management practices are generally fair to good. An improved conservation use-and-land treatment only program would provide limited reductions in runoff and flood stages.

These observations apply generally to all the study tributaries as do the recommendations listed in the main report. The primary opportunities have to do with prohibition of future construction or other encroachment in the flood plains; and with other regulations needed to avoid increased runoff and to minimize flood damages.

TECHNICAL DATA AND EXHIBITS

This section provides the data and exhibits needed by user agencies and individuals to make technical decisions and to comply with regulations on use of the flood plain on Pleasant Run.

The index map shows the area covered by the individual photomaps. Flood hazard photomaps show the area inundated by the 100 and 500-year floods. Where only one line is shown, there is no significant difference in the boundaries of the two flood areas. These photomaps should only be used to determine approximate flood elevations; they are based on semicontrolled mosaics and the boundaries shown may vary from the location on the ground.

Flood profile plates provide elevations of the 10, 50, 100 and 500-year floods at any location along the length of the streams. The elevations and discharges of the 10, 25, 50, 100 and 500-year flood at each surveyed cross section are given in Table PR-1. Sample cross sections illustrated how the flood area boundaries were located. Table PR-2 provides the description and elevation of benchmarks which are located on the photomaps.

Table PR-1 can be used to locate flood elevations on the ground at surveyed cross sections.

The photomaps, flood profiles and bench mark data can be used to locate flood elevations between surveyed cross sections, as follows:

1. On the appropriate photomap find the point on the stream where the flood line is to be located; then scale the distance along the stream to the nearest cross section.
2. On the appropriate flood profile sheet, scale the distance determined in Step 1 from the cross section back to the original stream location, and read the elevation of the desired flood frequency line.
3. Transfer the elevation determined in Step 2 to the ground from the nearest established benchmark.

A glossary, bibliography and discussion of technical procedures are included in the main report for this study. The basic data is on file in the office of the USDA Soil Conservation Service, Richmond, Virginia 23240.

LEGEND

Stream channel

100 year flood area

5

Stream miles

72

Surveyed cross sections

X BM 12

Bench mark

NOTE: When only one line and color is shown the 100 and 500 year flood areas are the same.



SOURCE: Semi-controlled mosaic prepared from
USDA-ASCS Aerial photography flown 1974
USDA-SCS-FORT WORTH, TEXAS 1983

PHOTO MAP PR 1

PLEASANT RUN

U.S. DEPARTMENT OF AGRICULTURE

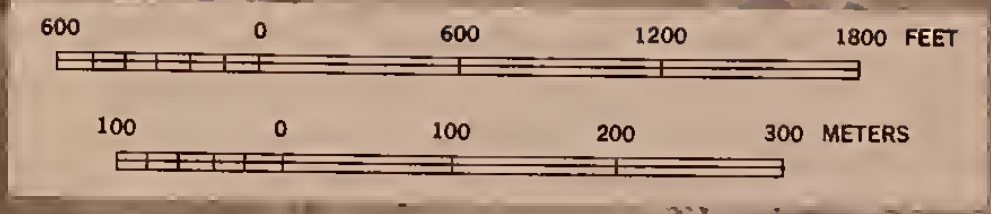
SOIL CONSERVATION SERVICE

SOUTH FORK SHENANDOAH RIVER TRIBUTARIES

FLOOD PLAIN MANAGEMENT STUDY

ROCKINGHAM COUNTY, VIRGINIA

SHEET 1 OF 3



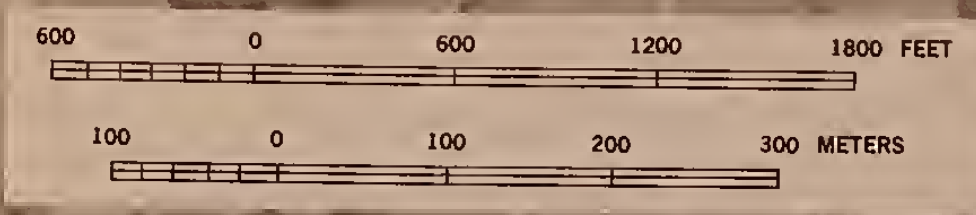
LEGEND

- Stream channel
- 100 year flood area
- Stream miles
- Surveyed cross sections
- Bench mark

NOTE: When only one line and color is shown the 100 and 500 year flood areas are the same.

SOURCE: Semi-controlled mosaic prepared from
USDA-ASCS Aerial photography flown 1974

USDA-SCS-FORT WORTH, TEXAS 1983



LEGEND

→ Stream channel

100 year flood area

2 Stream miles

93 Surveyed cross sections

X BM 23 Bench mark

NOTE: When only one line and color is shown the 100 and 500 year flood areas are the same.



SOURCE: Semi-controlled mosaic prepared from
USDA-ASCS Aerial photography flown 1974

FLOOD PROFILES

PLEASANT RUN
ROCK INGHAM COUNTY, VA.
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

NJM 8/78

Plate 1 of 3
See
Photomap
3

LEGEND

- | | | | |
|----------------|-------|--------------------|-------|
| 500 YR | ————— | SURVEYED X-SECTION | 99 |
| 100 YR | ————— | ELEV-BRIDGE DECK | I |
| 50 YR | ————— | ELEV-LOW BEAM | I |
| 10 YR | ————— | ELEV-LOW ROAD | — |
| LOW BANK | ————— | STATE ROUTE 99 | SR 99 |
| CHANNEL BOTTOM | ————— | US HIGHWAY 99 | US 99 |
| | | STREAM MILES | 99 |

ELEVATION (FEET NCVD)

ELEVATION (FEET NCVD)

Lower
Limit
of
Study

50 Year
Omitted

PLEASANT RUN - CHANNEL STATIONS
FEET ABOVE MOUTH

100+00 90+00 80+00 70+00 60+00 50+00 40+00 30+00 20+00 10+00 0+00

92

1190

1180

1170

1160

1150

1140

1130

1120

1110

93

94

95A

96

97B

98

99A

100

101B

1180

1170

1160

1150

1140

1130

1120

2

1

SR 682

SR 867

FLOOD PROFILES

PLEASANT RUN
ROCKINGHAM, COUNTY, VA.

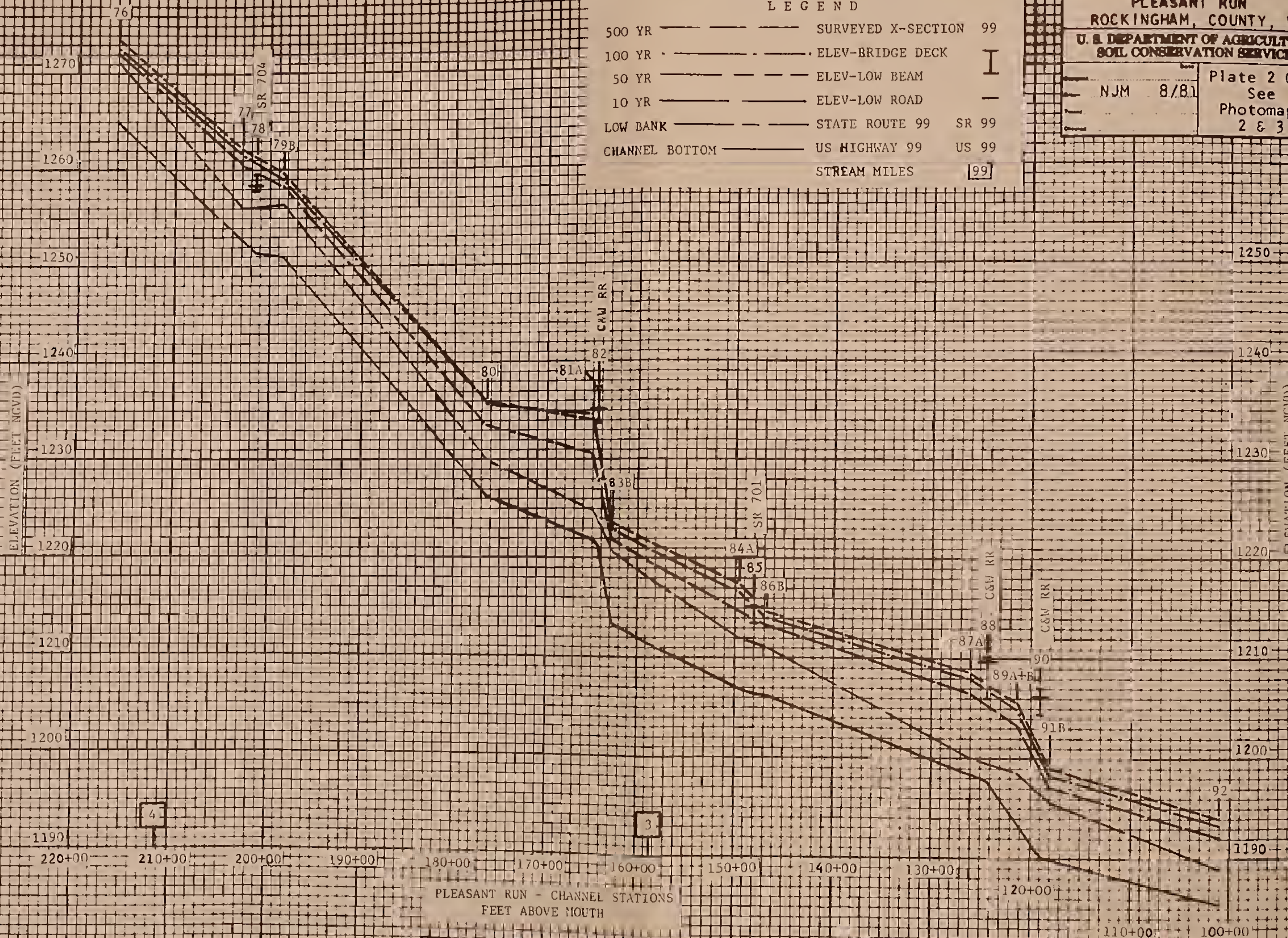
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SOIL CONSERVATION SERVICE

NJM 8/81

Plate 2 of 3
See
Photomaps
2 & 3

LEGEND

500 YR	—————	SURVEYED X-SECTION	99
100 YR	- - - - -	ELEV-BRIDGE DECK	I
50 YR	—————	ELEV-LOW BEAM	—
10 YR	—————	ELEV-LOW ROAD	—
LOW BANK	—————	STATE ROUTE 99	SR 99
CHANNEL BOTTOM	—————	US HIGHWAY 99	US 99
		STREAM MILES	[99]



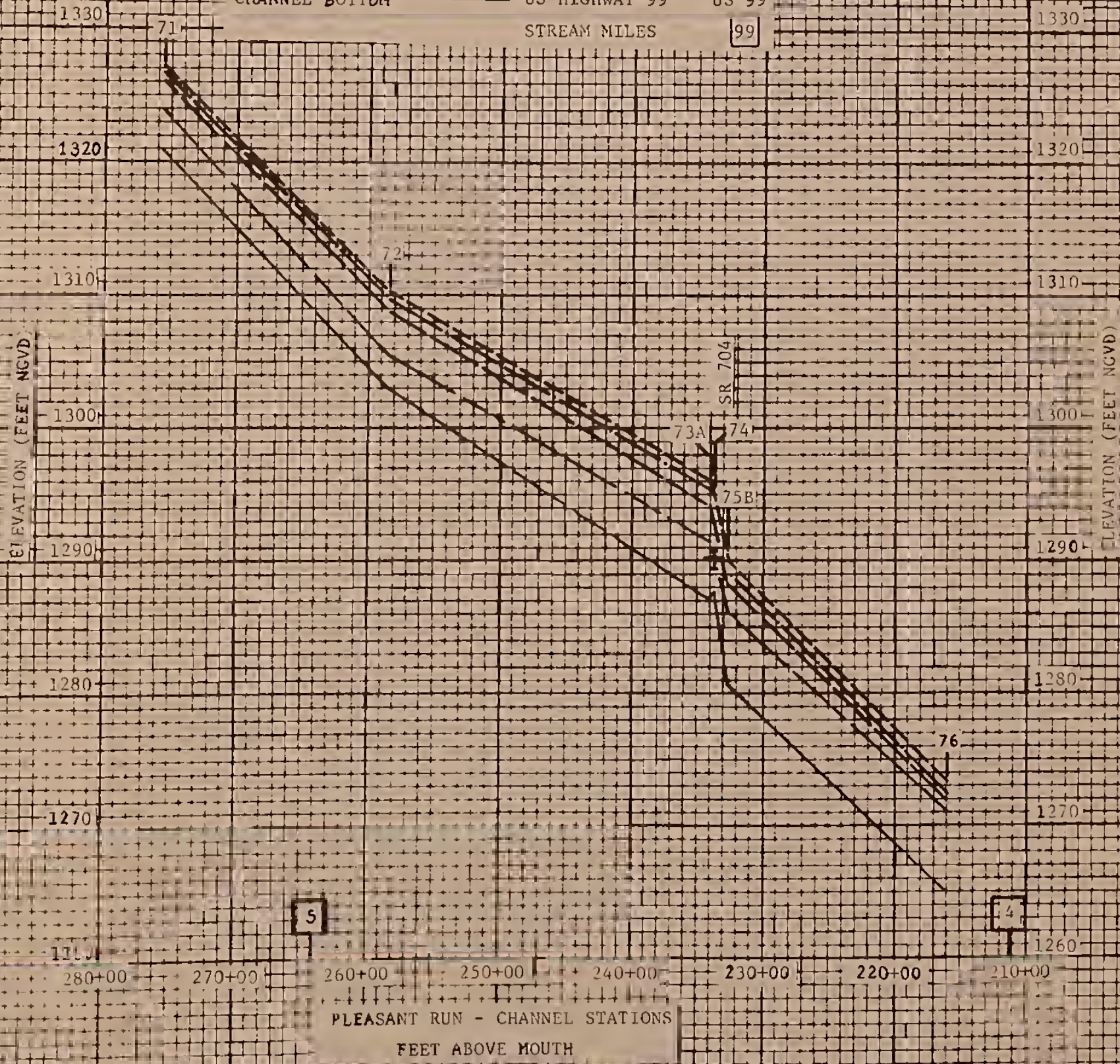
FLOOD PROFILES
PLEASANT RUN
ROCKINGHAM COUNTY, VA.
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Plate 3 of 3
 See
 Photomaps
 1 & 2

LEGEND

- 500 YR ——— SURVEYED X-SECTION 99
- 100 YR - - - - - ELEV-BRIDGE DECK
- 50 YR ——— ELEV-LOW BEAM
- 10 YR ——— ELEV-LOW ROAD
- LOW BANK ——— STATE ROUTE 99 SR 99
- CHANNEL BOTTOM ——— US HIGHWAY 99 US 99
- STREAM MILES 99

Upper
 Limit
 of
 Study



PLEASANT RUN - CHANNEL STATIONS
 FEET ABOVE MOUTH

TYPICAL CROSS SECTIONS
PLEASANT RUN
ROCKINGHAM COUNTY, VA.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

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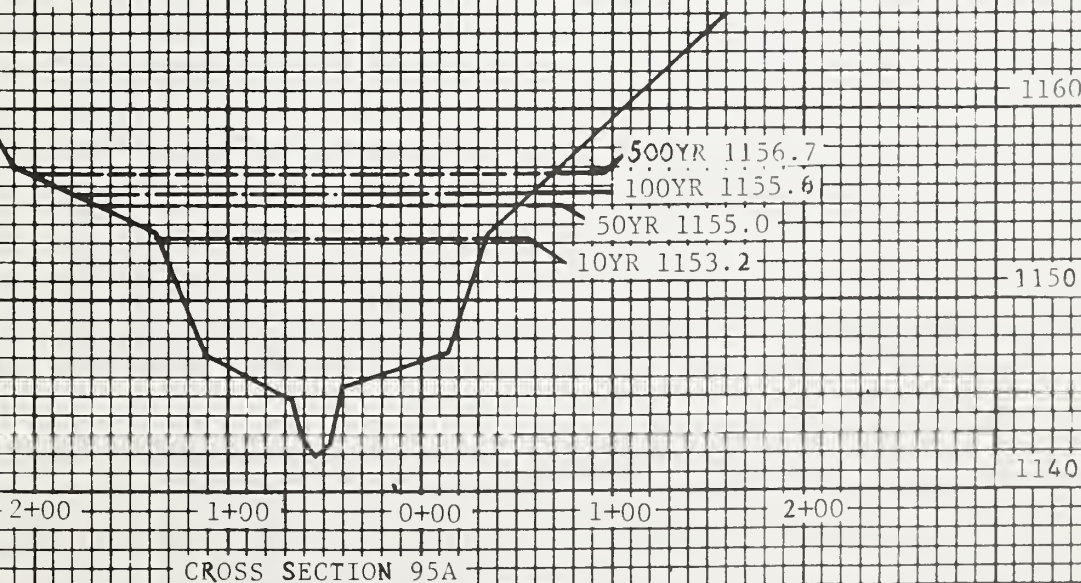
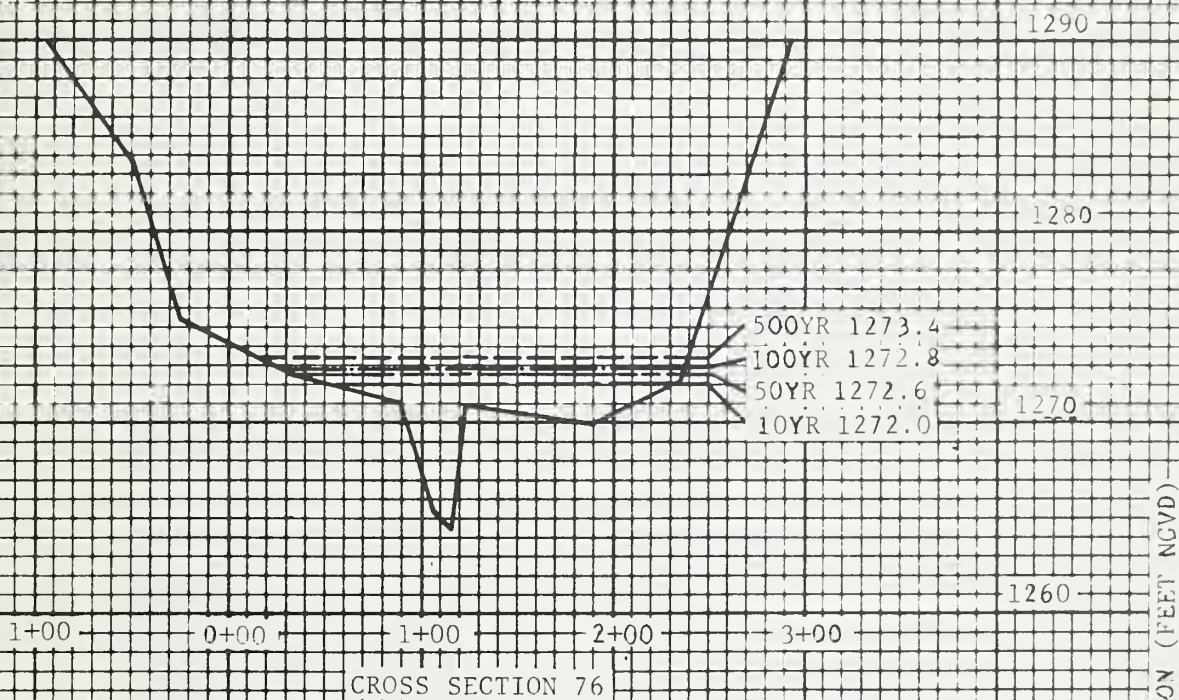


Table PR-1 Frequency-discharge-elevations, Pleasant Run; South Fork Shenandoah River Tributaries, Rockingham County, Virginia

X-Sec.	Photomap No.	Profile Plate No.	DA (sq mi)	10-year		25-year		50-year		100-year		500-year	
				Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)	Disch. (cfs)	Elev. (ngvd)
101B	3	1	8.04	3658.8	1131.5	4436.7	1134.6	5268.7	1136.6	6073.6	1138.8	8012.8	1144.6
100	3	1	8.03	3646.7	1139.9	4448.9	1139.9	5251.3	1141.5	6053.5	1142.6	7986.3	1144.8
99A	3	1	8.02	3646.7	1140.0	4449.0	1140.0	5251.2	1141.5	6053.5	1142.7	7986.3	1144.8
98	3	1	7.92	3586.4	1143.1	4375.4	1143.7	5164.4	1144.7	5953.4	1145.7	7854.2	1147.5
97B	3	1	7.86	3550.3	1148.9	4331.4	1149.4	5112.4	1150.3	5893.5	1150.9	7775.1	1152.3
96	3	1	7.50	3324.0	1153.1	4055.3	1154.1	4786.6	1154.8	5517.8	1155.4	7279.5	1156.5
95A	3	1	7.48	3324.0	1153.2	4055.3	1154.3	4786.6	1155.0	5517.8	1155.6	7279.6	1156.7
94	3	1	7.22	3171.3	1167.2	3869.0	1167.5	4566.7	1168.0	5264.4	1168.4	6945.1	1169.3
93	3	1	7.12	3113.0	1173.8	3797.9	1174.3	4482.7	1174.7	5167.6	1175.3	6817.5	1176.2
92	3&2	1&2	5.94	2446.6	1192.1	2984.9	1192.5	3523.1	1192.9	4061.4	1193.3	5358.0	1193.9
91B	3&2	2	5.79	2362.2	1197.2	2881.9	1197.6	3401.6	1198.1	3921.2	1198.4	5173.2	1199.0
90	3&2	2	5.78	2345.6	1202.9	2861.4	1204.4	3377.4	1204.5	3893.4	1204.5	5136.4	1205.3
89AB	3&2	2	5.76	2345.4	1203.3	2861.4	1204.6	3377.4	1204.8	3893.4	1204.8	5136.4	1205.6
88	3&2	2	5.25	1676.2	1206.4	2044.9	1207.1	2413.7	1207.5	2782.5	1207.8	3670.9	1208.5
87A	3&2	2	4.51	1676.2	1206.5	2045.0	1207.2	2413.7	1207.6	2782.5	1207.9	3670.9	1208.6
86B	2	2	4.33	1585.1	1213.1	1933.8	1213.4	2282.5	1213.7	2631.3	1213.9	3471.4	1214.6
85	2	2	4.32	1570.0	1214.5	1915.4	1215.3	2260.8	1215.9	2606.2	1216.4	3438.3	1217.3
84A	2	2	4.30	1570.0	1214.7	1915.4	1215.5	2260.8	1216.0	2606.2	1216.5	3438.3	1217.4
83B	2	2	4.10	1470.6	1221.9	1794.1	1222.3	2117.7	1222.6	2441.2	1223.0	3220.6	1223.6
82	2	2	4.10	1460.8	1230.6	1782.2	1232.1	2103.5	1233.6	2424.9	1234.5	3199.2	1233.8
81A	2	2	4.08	1460.8	1230.6	1782.2	1232.1	2103.6	1233.6	2424.9	1234.6	3199.1	1233.9
80	2	2	3.92	1382.7	1233.5	1686.9	1234.3	1991.1	1235.1	2295.3	1235.9	3028.1	1236.0
79B	2	2	3.66	1368.8	1258.1	1669.9	1258.4	1971.1	1258.8	2272.2	1259.0	2997.7	1259.6
78	2	2	3.65	1367.7	1260.3	1668.6	1260.6	1969.5	1260.9	2270.4	1261.2	2995.3	1261.9
77A	2	2	3.64	1367.7	1260.5	1668.6	1260.9	1969.5	1261.3	2270.4	1261.6	2995.3	1262.2
76	2	2&3	3.48	1358.6	1272.0	1657.5	1272.4	1956.4	1272.6	2255.3	1272.8	2975.3	1273.4
75B	2&1	3	3.22	1343.1	1288.2	1638.6	1288.6	1934.1	1289.0	2229.5	1289.2	2941.4	1290.1
74	2&1	3	3.22	1342.5	1294.2	1637.9	1294.6	1933.2	1294.9	2228.6	1295.3	2940.1	1295.9
73A	2&1	3	3.21	1342.5	1294.2	1637.8	1294.6	1933.2	1295.0	2228.5	1295.3	2940.1	1296.0
72	1	3	2.32	1279.7	1308.8	1561.2	1309.2	1842.8	1309.5	2124.3	1309.7	2802.5	1310.3
71	1	3	1.93	1245.4	1326.0	1519.4	1326.2	1793.4	1326.4	2067.4	1326.7	2727.4	1327.1

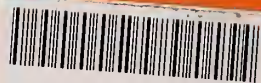
Table FR-2 Reference mark descriptions and Elevations, Pleasant, Run,
Rockingham County, Virginia

Photo Sheet		
<u>BM</u>	<u>No</u>	<u>Elevations and Descriptions</u>
12	1	SCS TBM - A square is chiseled on the northeast corner of concrete bridge over Pleasant Run leading to a dwelling on the Baily Farm. Elevation 1290.69
10	2	SCS TBM - A square is chiseled on the northeast upstream abutment of bridge over Pleasant Run on State Route 704 at lane leading to Garber Farm. Elevation 1258.91
17	2	SCS TBM - A SCS disk in base of Power Pole 44 approximately 40 feet northwest of Railroad Crossing on State Route 988. Elevation 1224.28
18	3	SCS TBM - A square is chiseled on the southeast downstream abutment of Railroad Bridge over Pleasant Run east of Liskey Tenant dwelling.
23	3	SCS TBM - A square is chiseled on the northeast upstream abutment of bridge over Pleasant Run on State Route 257. Elevation 1153.04

Note: Elevation in feet above National Geodetic Vertical Datum of 1929.



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